Claims

[c1] 1. A mercury vapor discharge fluorescent lamp comprising a light-transmissive glass envelope having an inner surface, a phosphor layer disposed adjacent said inner surface of said glass envelope, a discharge-sustaining fill gas of mercury vapor and inert gas sealed inside said envelope, and a mercury barrier, said mercury barrier being effective to inhibit mercury atoms from absorbing into said glass envelope and amalgamating with sodium atoms therein, wherein said mercury barrier is substantially non-mercury absorptive.

[c2] 2. A lamp according to claim 1, said glass envelope being made from soda-lime glass.

[c3] 3. A lamp according to claim 1, said mercury barrier comprising a material selected from the group consisting of potassium atoms, potassium ions, calcium atoms, calcium ions, SnO_2, and mixtures thereof.

[c4] 4. A lamp according to claim 1, said mercury barrier being a mercury-insulating section of said glass envelope, said mercury-insulating section extending radially outward from said inner surface of said glass envelope.

[c5] 5. A lamp according to claim 4, wherein said mercury-insulating section has a radial depth of at least 10 μ m measured from said inner surface of said glass envelope.

[c6] 6. A lamp according to claim 4, wherein said mercury-insulating section has a radial depth of 25-100 mm measured from said inner surface of said glass envelope.

[c7] 7. A lamp according to claim 4, wherein said mercury-insulating section is a compressional section of densely packed species, and wherein said densely packed species does not substantially complex, react, or amalgamate with said mercury vapor inside said envelope.

[c8] 8. A lamp according to claim 4, wherein said mercury-insulating section is substantially transmissive of visible light.

[c9] 9. A lamp according to claim 7, wherein said densely packed species is selected from the group consisting of potassium atoms and potassium ions.

[c10] 10. A lamp according to claim 7, wherein said densely packed species is selected from the group consisting of calcium atoms and calcium ions.

[c11] 11. A lamp according to claim 4, wherein said mercury-insulating section of said glass envelope is substantially electrically non-conductive.

[c12] 12. A lamp according to claim 1, said lamp exhibiting fewer than 30 degrees of discoloration at 2000 hours of cyclical operation.

[c13] 13. A lamp according to claim 1, said lamp exhibiting fewer than 30 degrees of discoloration at 3000 hours of cyclical operation.

[c14] 14. A lamp according to claim 1, said lamp having a lumen efficiency of at least 54 lumens/watt at 2000 hours cyclical operation.

[c15] 15. A lamp according to claim 1, said lamp having a lumen efficiency of at least 54 lumens/watt at 3000 hours of cyclical operation.

[c16] 16. A lamp according to claim 1, said lamp having a lumen maintenance of at least 0.88 at 2000 hours of cyclical operation.

[c17] 17. A lamp according to claim 1, said lamp having a lumen maintenance of at least 0.88 at 3000 hours of cyclical operation.

[c18] 18. A lamp according to claim 1, said mercury barrier being a mercury barrier layer disposed adjacent said phosphor layer.

[c19] 19. A lamp according to claim 18, said mercury barrier layer being a potassium-containing layer having at least 0.5, weight percent potassium.

[c20] 20. A lamp according to claim 19, said mercury barrier layer being 10-100 nm thick.

[c21] 21. A lamp according to claim 1, said mercury barrier being a tin oxide barrier layer disposed adjacent said inner surface of said glass envelope.

[c22] 22. A lamp according to claim 21, said tin oxide barrier layer being a compressional layer of densely packed non-activated and substantially electrically non-conductive tin oxide.

[c23] 23. A lamp according to claim 21, said tin oxide barrier layer being 5-200 nanometers thick.

[c24] 24. A lamp according to claim 1, said phosphor layer comprising a metal ion species therein as said mercury barrier.

[c25] 25. A lamp according to claim 24, wherein said metal ion species is selected from the group consisting of potassium species, calcium species, and mixtures thereof.

[c26] 26. A lamp according to claim 24, wherein said metal ion species is a potassium salt selected from the group consisting of potassium chloride, potassium nitrate, potassium borate, and mixtures thereof.

[c27] 27. A lamp according to claim 1, said lamp being a high wattage fluorescent lamp and having a lumen maintenance of at least 0.6 at 2000 hours of cyclical operation.

[c28] 28. A lamp according to claim 1, said lamp being a high wattage fluorescent lamp and having a lumen maintenance of at least 0.6 at 3000 hours of cyclical operation.